detecting an intensity maximum reflected at the second wavelength first occurring after the last intensity maximum at the first wavelength.

REMARKS

Claims 1 and 8 have been amended for clarity. Claims 1-15 are pending in the application. No new matter has been added.

Claims 1 and 8 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner stated that "In both claims, "estimating the etch endpoint", and detecting based on the "estimated etch endpoint" is vague and indefinite, as an "estimated" value is a subjective measure." Applicant respectfully traverses. Whether a claim is invalid for indefiniteness depends on whether those skilled in the art would understand what is claimed when the claim is read in light of the specification. Morton Int'l, Inc. v. Cardinal Chemical Co., 5 F.3d 1464, 28 USPQ2d 1190 (Fed. Cir. 1993).

Estimating an etch endpoint value is well known by those skilled in the semiconductor etching arts, as attested to by the over 7000 issued U.S. patents using the term "estimating" in their claim sets. Indeed, estimating an etching endpoint is so well known that over 500 issued U.S. patents concerning semiconductors use the term "estimating" in their claim sets. As such, those skilled in the art would understand the meaning of "estimating the etch endpoint" when read in light of the specification. Hence, the Applicants submit that "estimating the etch endpoint", as claimed, particularly points out and distinctly claims subject matter which the Applicants regard as their invention.

Accordingly, the Applicants respectfully submit claims 1 and 8 to be patentable and request withdrawal of this rejection.

Claims 1-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,499,733 to Litvak in view of U.S. Patent No. 5,131,752 to Yu et al. (Yu). As will be fully explained below, the combination of the Litvak and Yu references does not establish a *prima facie* case of obviousness against the subject matter defined in claims 1-14, either as originally filed or as amended herein for purposes of clarification.

Each of the claim elements is addressed separately below, but in general unsupported assertions of what those skilled in art might have done do not provide a level of support which meets the Office's burden of proof. Of course, those skilled in the art *could* have tried to accomplish much had they had the perspectives of and the benefit of hindsight from the present inventors. With the hindsight of these perspectives, they might have even tried to achieve the present invention – but as the art of record poignantly shows, they did not.

In spite of attempts by those skilled in the art to address the problems solved by the present invention, until the present invention, those problems were not solved in the manners claimed. To a large degree, the references cited actually show the exact opposite – that the understanding of those skilled in the art at the time the invention was made did not include the perspective which the present inventors had. To say that those of ordinary skill could have achieved the various claimed elements and combinations is not only unsupported, but it begs the question. Of course, once traversed, it is improper to maintain an unsupported allegation. As the courts have long stated:

> "[W]e reject the notion that judicial or administrative notice may be taken of the state of the art. The facts constituting the state of the art are normally subject to the possibility of rational disagreement among reasonable men and are not amenable to the taking of such notice. If evidence of the knowledge possessed by those skilled in the art is to be properly considered, it must be timely injected into the proceedings"

In re Eynde, 480 F.2d 1364 (CCPA 1973). See also Ex Parte Clapp, 227 USPQ 972 (Bd. Pat. App. & Inter. 1985) and In re Bron, 439 F.2d 724 (1971). Examiners are even cautioned in their training materials against basing rejections on allegations of their personal impressions of what might be a design choice -- essentionally what might be obvious. To maintain such allegations, evidence is necessary. Of course, the Applicants have traversed the allegations and -- to the extent not now mooted by the response – request this evidence to support each of the propositions proposed. Further, while several specific allegations are addressed below, this request should be understood to apply to each of the unsupported allegations raised in the action.

Perhaps the most evident example that the aspects are not, in fact, obvious relates to the elements of "detecting a last intensity maximum reflected at the first wavelength prior to the estimated etch endpoint", and "detecting an intensity maximum reflected at the second wavelength first occurring after the last intensity maximum at the first wavelength", as recited in independent claims 1 and 8. As to these elements the action acknowledges that the art does not indicate detecting the intensities in relation to estimated endpoints.

Indeed, neither the Litvak reference nor the Yu reference disclose these elements. The simple assertion that it would have been obvious to "modify Litvak by determining

the maximum intensities of two different wavelengths in relation to an "estimated endpoint" " is not what is claimed. What is claimed are specific combinations involving detecting an intensity maximum in a first wavelength and detecting an intensity maximum in a second wavelength that occurs after the last intensity maximum at the first wavelength. In this manner, endpoint detection is greatly enhanced, as the last intensity maximum in the first wavelength is used to approximate the endpoint, and the following intensity in the second wavelength refines the endpoint detection. Since the endpoint occurs after the detection of the intensity maximum in a second wavelength, by choosing a sufficiently short second wavelength, the etch endpoint will be extremely close to the underlying layer.

Litvak discloses exposing the wafer surface to a single wavelength light source and determining an endpoint when the reflected maximum and minimum signal oscillations stop and the reflected signal remains constant. (Litvak, col. 8, lines 18-20). There is simply no reference to detecting the reflected maximum and minimum of a second signal and using the combination of the two signals to determine the endpoint, as required by independent claims 1 and 8.

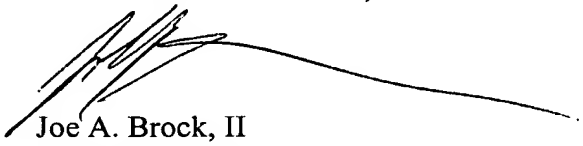
As an alternative, Litvak discloses exposing the wafer surface to a broad spectrum light source, such as white light, and charting the results as signal vs. wavelength, rather than signal vs. time. (Litvak, col. 12, lines 61-67 and col. 13, lines 1-6). However, in this case, the maximum and minimum of a particular wavelength cannot be detected, since each wavelength is displayed as a single point on the graph and hence forms no maximum or minimum for a particular wavelength, as required by independent

claims 1 and 8. Hence, neither the Litvak reference nor the Yu reference disclose the particular combinations as required in independent claims 1 and 8.

Accordingly, independent claims 1 and 8 are submitted to be patentable under 35 U.S.C. § 103(a) over the Litvak patent in view of the Yu patent. Claims 2-7 and 9-15, each of which ultimately depends from independent claims 1 and 8 respectively, are likewise submitted to be patentable under U.S.C. § 103(a) over the Litvak patent in view of the Yu patent for at least the same reasons set forth above regarding independent claims 1 and 8.

In view of the foregoing, Applicants respectfully request reconsideration and reexamination of claims 1-15, and submit that these claims are in condition for allowance. Accordingly, a notice of allowance is respectfully requested. In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at **(408) 749-6900 x6920**. If any fees are due in connection with the filing of this paper, then the Commissioner is authorized to charge such fees to Deposit Account No. 50-0805 (Order No. LAM2P282). A copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
MARTINE & PENILLA, LLP



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of	Docket No. LAM2P282
Ni et al.	Group Art Unit: 1765
Application No. 09/586,530	Examiner: V. Perez-Ramos
Filed: May 31, 2000	Date: July 30, 2001
For: ETCH ENDPOINT DETECTION	

MARKED UP CLAIMS

1. (Amended) A method for determining an endpoint for etching a layer, comprising steps of:

estimating [the] an endpoint; and, during etch,

directing radiant energy at two or more wavelengths onto the layer to be etched,

detecting [the] a last intensity maximum reflected at a first wavelength prior to the estimated etch endpoint, and

detecting [the] an intensity maximum reflected at a second wavelength first occurring after the last intensity maximum at the first wavelength.

8. (Amended) A method for determining an endpoint for etching a layer having an approximate initial thickness, comprising steps of, during etch,

directing radiant energy at three or more wavelengths onto the layer to be etched;

selecting first, second, and third wavelengths;

approximating an etch rate from [the] a time interval between a first detected intensity minimum and an adjacent intensity maximum reflected at the third wavelength, and estimating an etch endpoint from the approximate initial thickness of the layer and the approximate etch rate;

detecting [the] a last intensity maximum reflected at the first wavelength prior to the estimated etch endpoint; and

detecting [the] an intensity maximum reflected at the second wavelength first occurring after the last intensity maximum at the first wavelength.[.]